

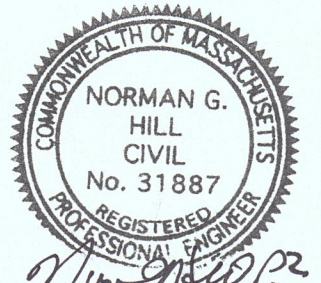
## Plan & Elevations

Prepared For  
**Magill Associates, Inc.**  
21 Central Square  
P.O. Box 565  
Grafton, MA 01519

**April 10, 2017**  
**Scale: As Noted**

### LEGEND

○	IRON PIN FOUND
○	DRILL HOLE FOUND
□	BOUND FOUND
⊗	DRAIN MANHOLE
⊗	SEWER MANHOLE
⊗	UTILITY POLE
⊗	HYDRANT
⊗	GATE VALVE
⊗	CURB STOP
—500—	EXISTING CONTOUR
	PROPOSED CONTOUR
500.0x	PROPOSED SPOT GRADE
○	LIGHT FIXTURE - POLE MOUNT
○	LIGHT FIXTURE - WALL MOUNT
○	SIGN
—w—	WATER LINE
—g—	GAS
—s—	SEWER SERVICE



ate: 4-14-17

erman G. Hill, PE #31887

## REVISIONS

No.	Date	Design	Checked

Field By:		
Designed By:	MHG	4/17
Drawn By:	MHG	4/17
Checked By:	NGH	4/17



**Land Planning, Inc.**  
Civil Engineers • Land Surveyors  
Environmental Consultants

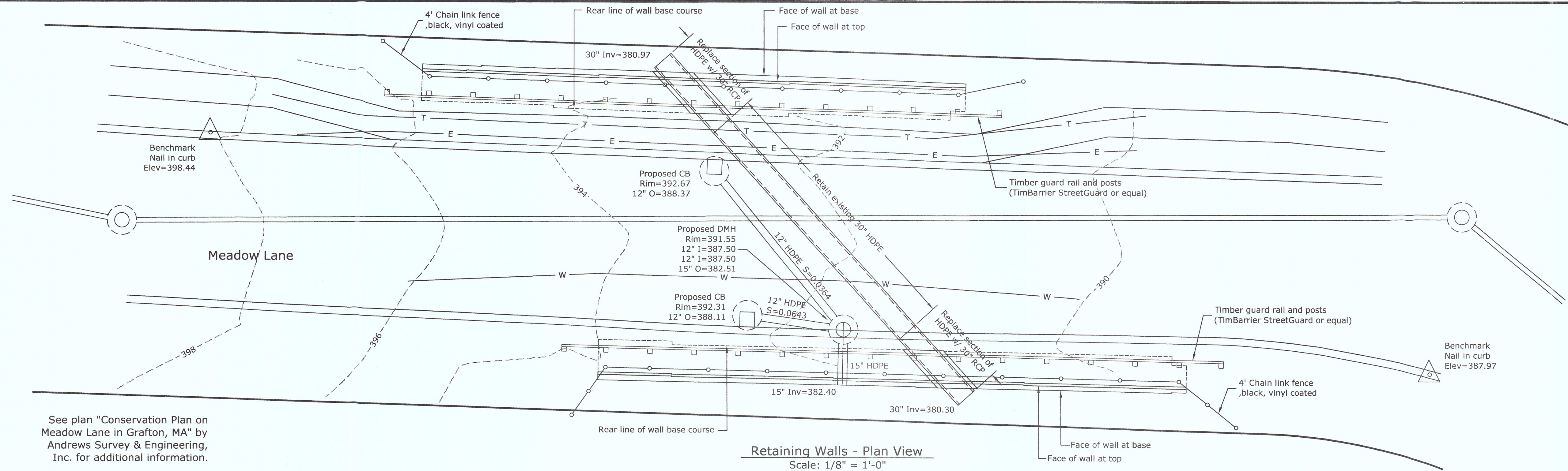
**Bellingham**  
167 Hartford Ave.  
Bellingham, MA 02019  
508-966-4130

**North Grafton**  
214 Worcester St.  
Grafton, MA 01536  
508-839-9526

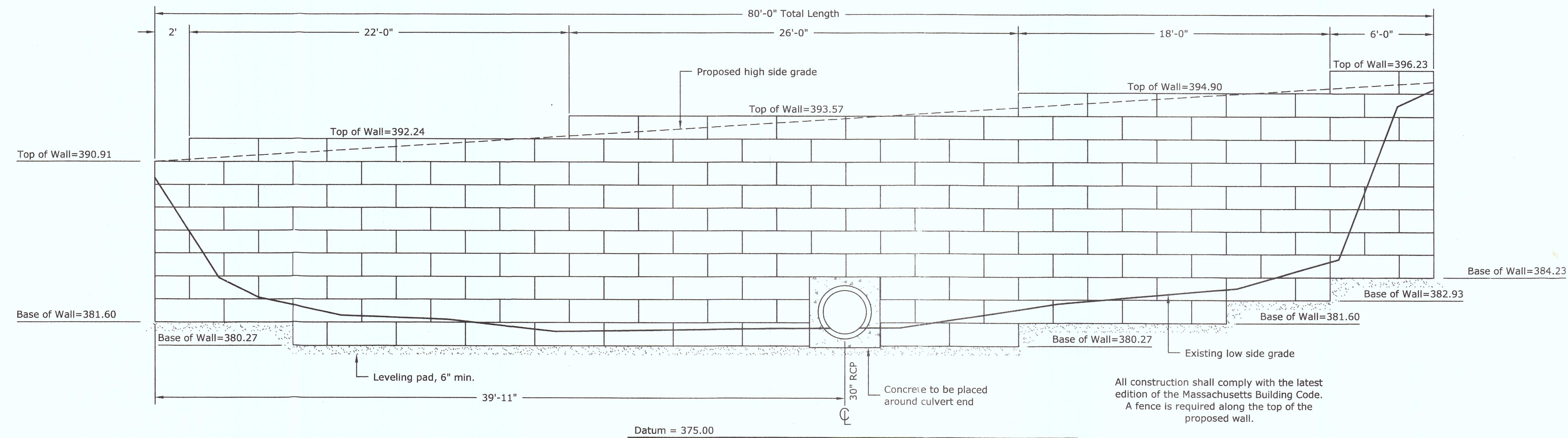
**Hanson**  
1115 Main Street  
Hanson, MA 02341  
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[www.landplanninginc.com](http://www.landplanninginc.com)

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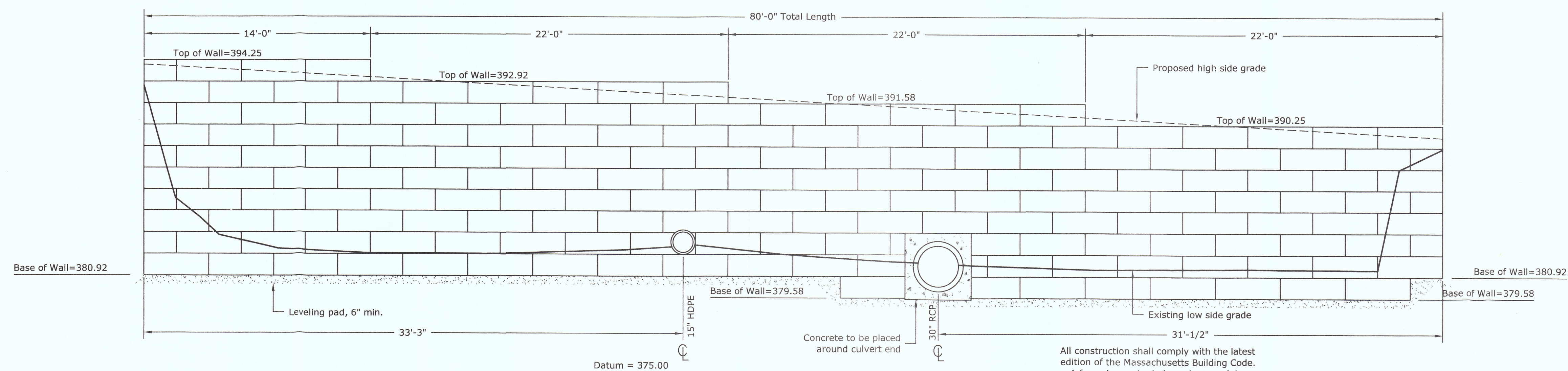


Retaining Walls - Plan View  
Scale: 1/8" = 1'-0"



### North Retaining Wall Elevation

Scale: 1/4" = 1'-0"



### South Retaining Wall Elevation

Scale: 1/4" = 1'-0"

RECEIVED  
MAY - 5 2017  
INSPECTOR OF BUILDINGS  
TOWN OF GRAFTON



A. All concrete will be mixed to achieve a minimum 3,000 psi compressive strength in 28 days. In areas of freeze/thaw cycles, adequate protection by air-entrainment must be provided.

A. Work shall consist of construction of a Retaining Wall System in accordance with these specifications and in reasonably close conformity with the lines, grades, design, and dimensions as shown.

C. Base Leveling Pad Material shall consist of a compacted crushed stone base or non-reinforced concrete as shown.

D. Unit Drainage Fill shall consist of clean 1" minus crushed stone or crushed gravel meeting the following gradation tested in accordance with ASTM D-422:

Sieve Size	Percent Passing
1 inch	100
3/4 inch	75-100
No. 4	0-10
No. 50	0-5

E. One cubic foot, minimum, of drainage fill shall be used for each square foot of wall face. Drainage fill shall be placed between and behind units to meet this requirement.

F. Reinforced Backfill shall be free of debris and stones larger than 2". Backfill soil shall be classified as UNCS SW, SP, or SM.

1. The maximum aggregate size shall be limited to 3/4 inch unless field tests have been performed to evaluate potential strength reductions to the geogrid design due to damage during construction.
2. Material can be site excavated soils where the above requirements can be met. Unsuitable soils for backfill (high plastic clays, organic soils, soils with >12% fines) shall not be used in the backfill or in the reinforced soil mass.
3. Contractor shall submit reinforced fill sample and laboratory test results to the Engineer for approval prior to the use of any proposed reinforced fill material.

G. Geogrid Soil Reinforcement shall consist of high tenacity geogrids or geotextiles manufactured specifically for soil reinforcement applications. The type, strength and location shall be as shown.

H. Drainage collection pipe shall be a perforated or slotted corrugated HDPE pipe. The pipe and drainage aggregate shall be wrapped with a geotextile fabric that will function as a filter.

I. All buried utilities as shown are taken from available information and are to be considered as approximate only. Prior to commencement of construction, the contractor is to contact DIG SAFE at 1-888-DIG SAFE to have all buried utilities properly located.

### A. Excavation

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1. Contractor shall excavate to the lines and grades as shown. The Engineer shall inspect the excavation and approve prior to placement of leveling material or fill soils.
2. Following excavation for the leveling pad and/or reinforced soil zone, the soil shall be examined by the Engineer to assure the actual foundation soil strength meets or exceeds the assumed designed bearing strength. Soils not meeting the required strength shall be removed and replaced with soil meeting the design criteria, as directed by the Engineer.

### B. Base Leveling Pad

1. Leveling pad material shall be placed to the lines and grades shown, to a minimum thickness of 6 inches and extend laterally a minimum of 6' in front and behind the concrete wall unit.
2. Soil leveling pad materials shall be compacted to a minimum of 95% of the maximum standard Proctor density per ASTM D-698.
3. Leveling pad shall be prepared to insure full contact to the base surface of the concrete units.

### C. Modular Unit Installation

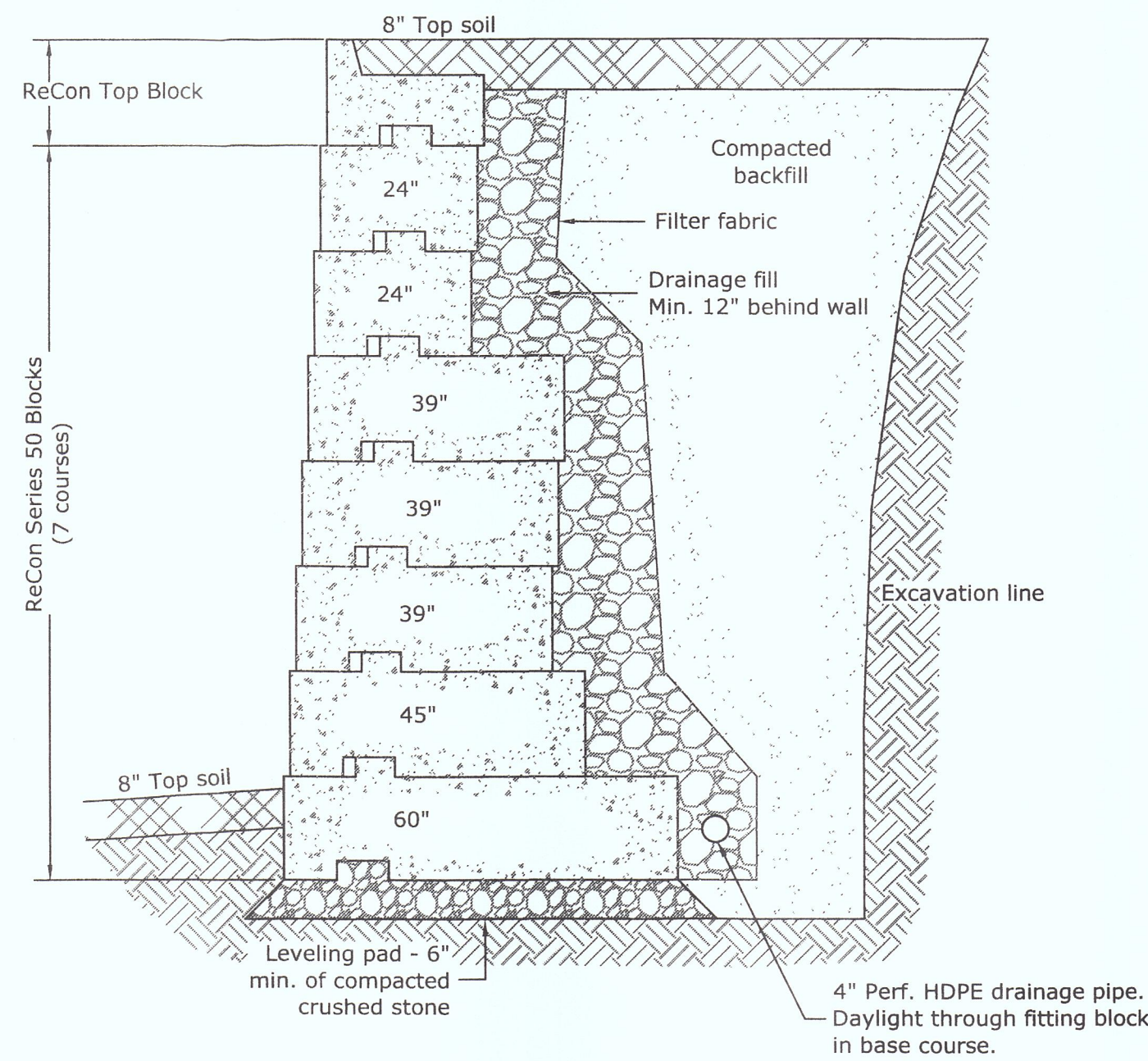
1. First course of units shall be placed on the leveling pad at the appropriate line and grade. Alignment and level shall be checked in all directions and insure that all units are in full contact with the base and properly seated.
2. Place the front of units side-by-side. Do not leave gaps between adjacent units. Layout of corners and curves shall be in accordance with manufacturer's recommendations.
3. Place and compact drainage fill within and behind wall units. Place and compact backfill soil behind drainage fill. Follow wall erection and drainage fill closely with structure backfill.
4. Maximum stacked vertical height of wall units, prior to unit drainage fill and backfill placement and compaction, shall not exceed one course.

#### E. Reinforced Backfill Placement

1. Reinforced backfill shall be placed, spread, and compacted in such a manner that minimizes the development of slack in the geogrid and installation damage.
2. Reinforced backfill shall be placed and compacted in lifts not to exceed 6 inches where hand compaction is used, or 8-10 inches where heavy compaction equipment is used. Lift thickness shall be decreased to achieve the required density as required.
3. Reinforced backfill shall be compacted to 95% of the maximum density as determined by ASTM D698. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer and shall be dry of optimum, + 0%, - 3%.
4. Only lightweight hand-operated equipment shall be allowed within 3 feet from the soil side of the modular concrete unit.
5. Tracked construction equipment shall not be operated directly upon the geogrid reinforcement. A minimum lift thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Tracked vehicle turning should be kept to a minimum to prevent tracks from displacing the lift and damaging the geogrid.
6. Rubber tired equipment may pass over geogrid reinforcement at slow speeds, less than 10 MPH. Sudden braking or sharp turning shall be avoided.
7. At the end of each day's operation, the Contractor shall slope the last lift of reinforced backfill away from the wall units to direct runoff away from wall face. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

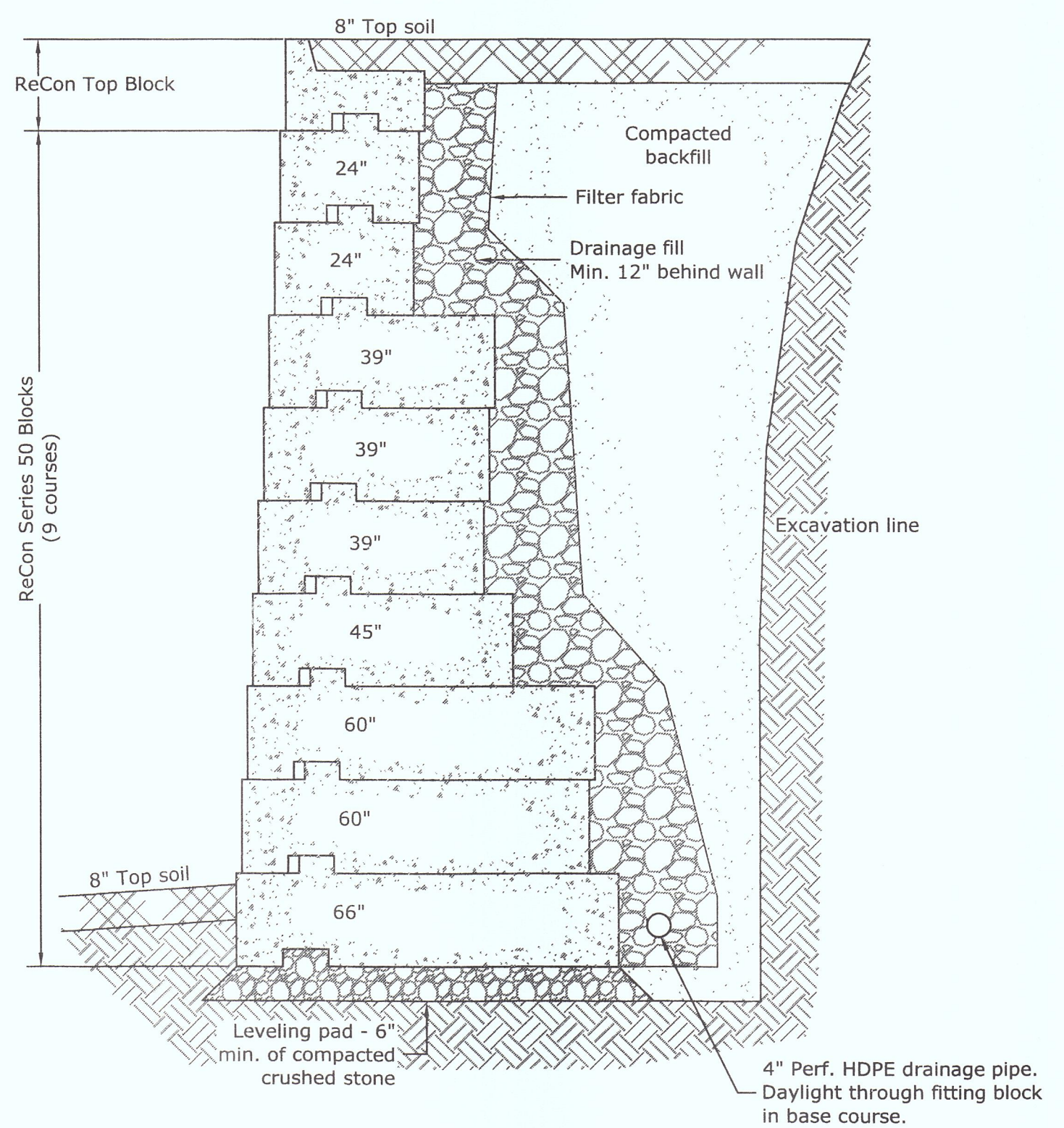
#### F. Field Quality Control

1. The Owner shall engage inspection and testing services, including independent laboratories, to provide quality assurance and testing services during construction. This does not relieve the Contractor from securing the necessary construction control testing during construction.
2. Testing and inspections services shall only be performed by qualified and experienced technicians and engineers.
3. As a minimum, quality assurance testing should include foundation soil inspection, soil and backfill testing, verification of design parameters, and observation of construction for general compliance with design drawings and specifications.



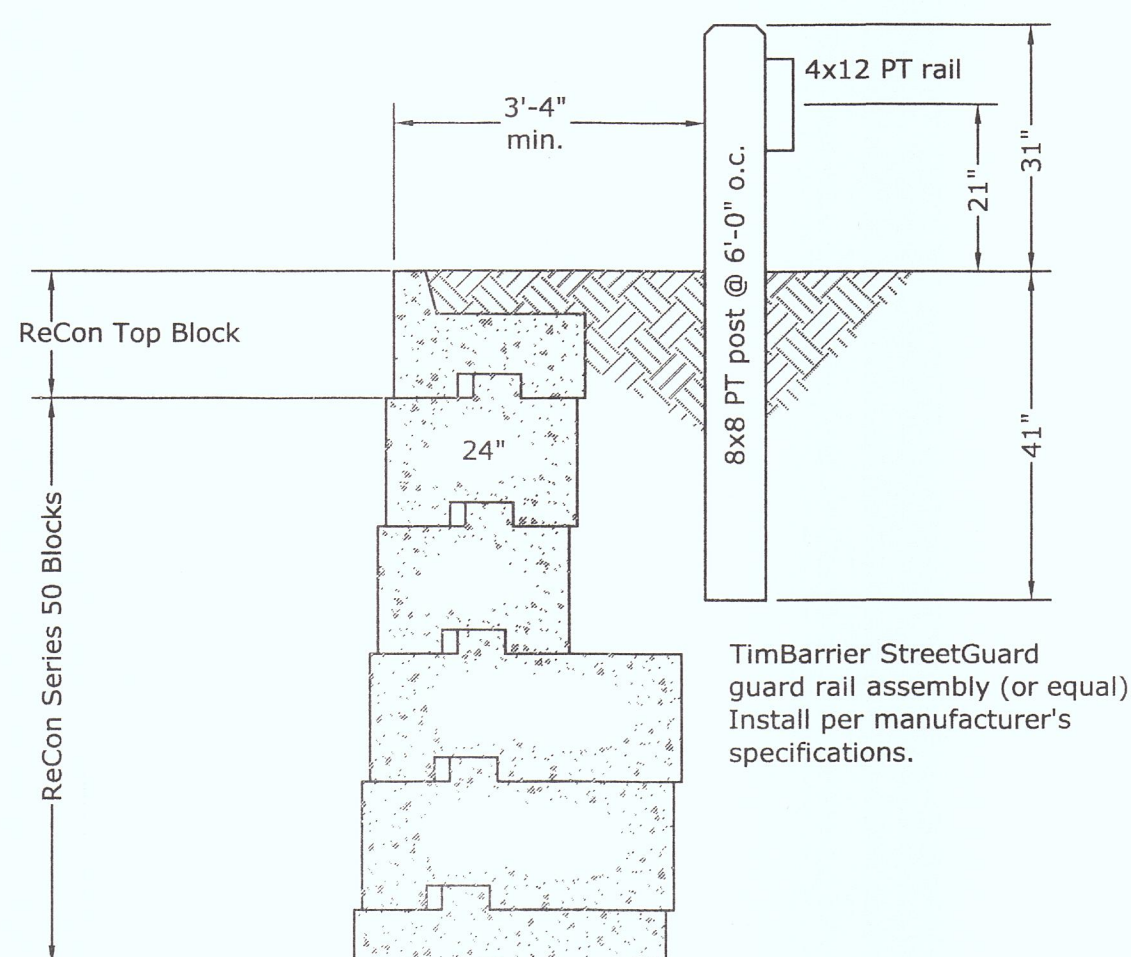
### 8 Course Wall Section

Scale:  $1/2" = 1'-0"$



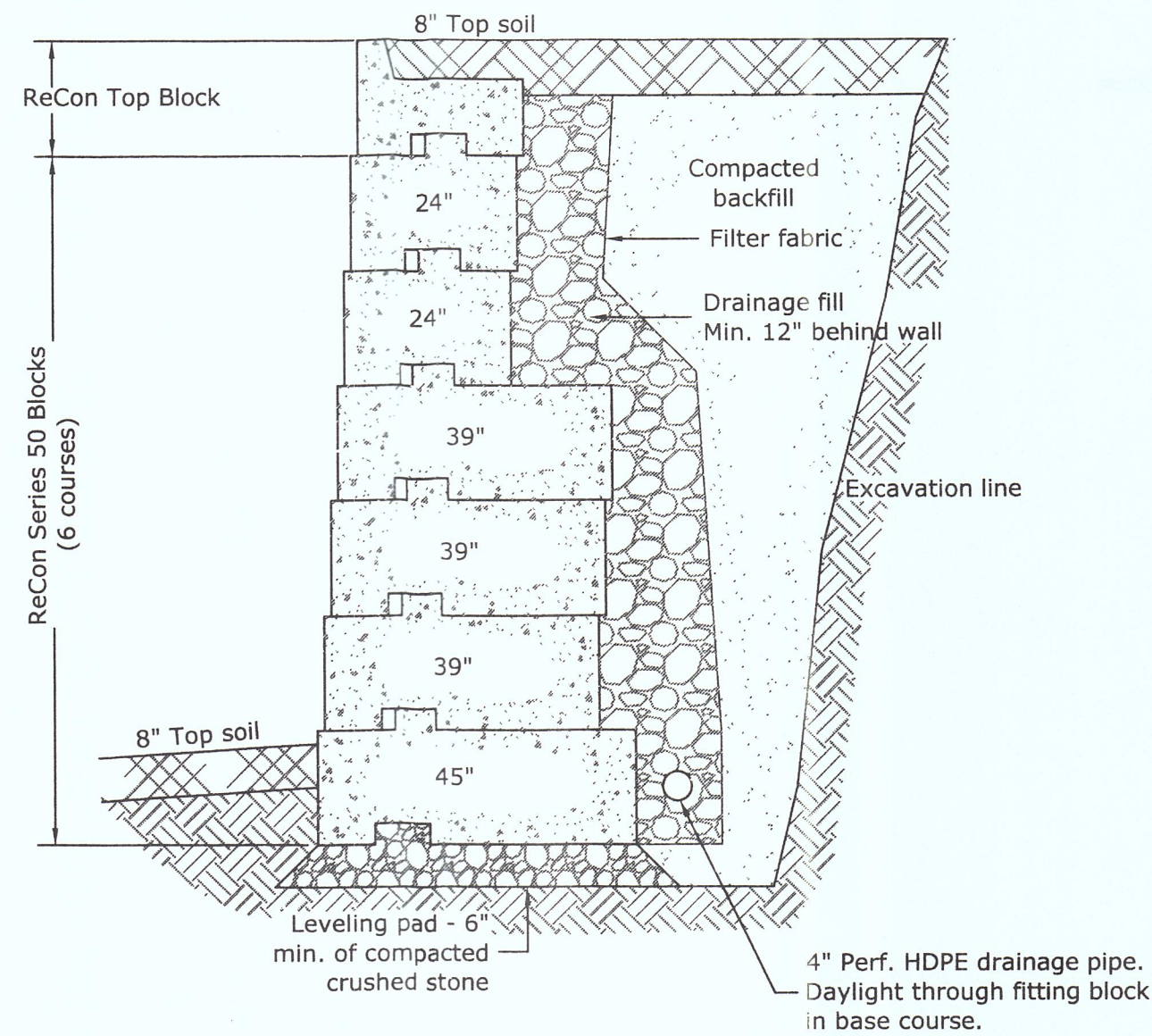
### 10 Course Wall Section

Scale:  $1/2'' = 1'-0''$



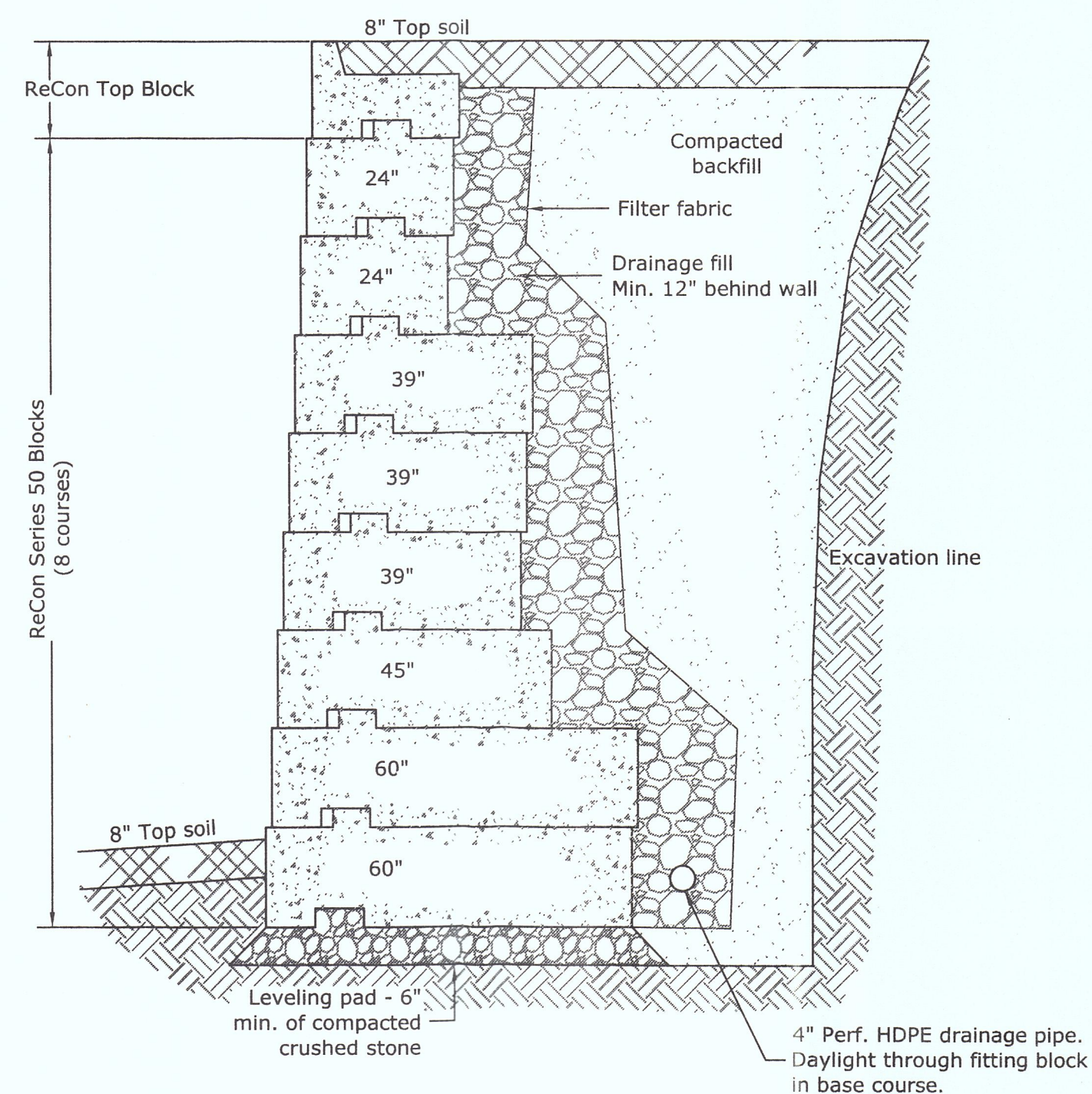
### Guard Rail Placement Detail

Scale: 1/2" = 1'-0"



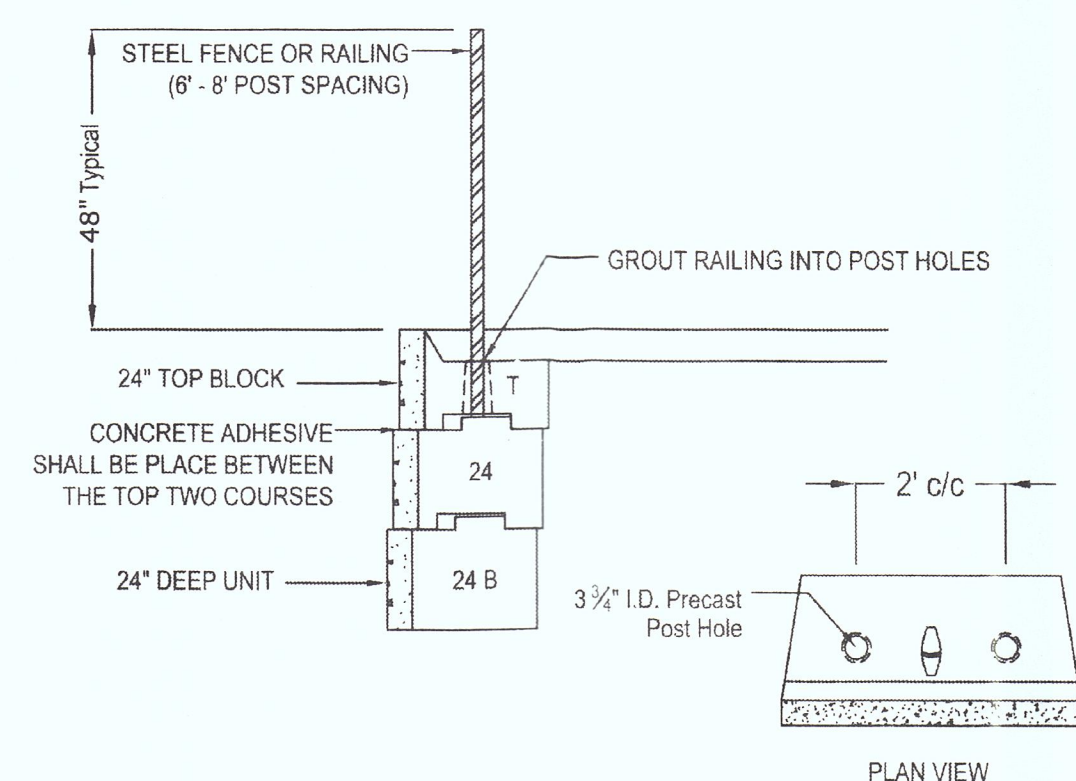
### 7 Course Wall Section

Scale:  $1/2" = 1'-0"$



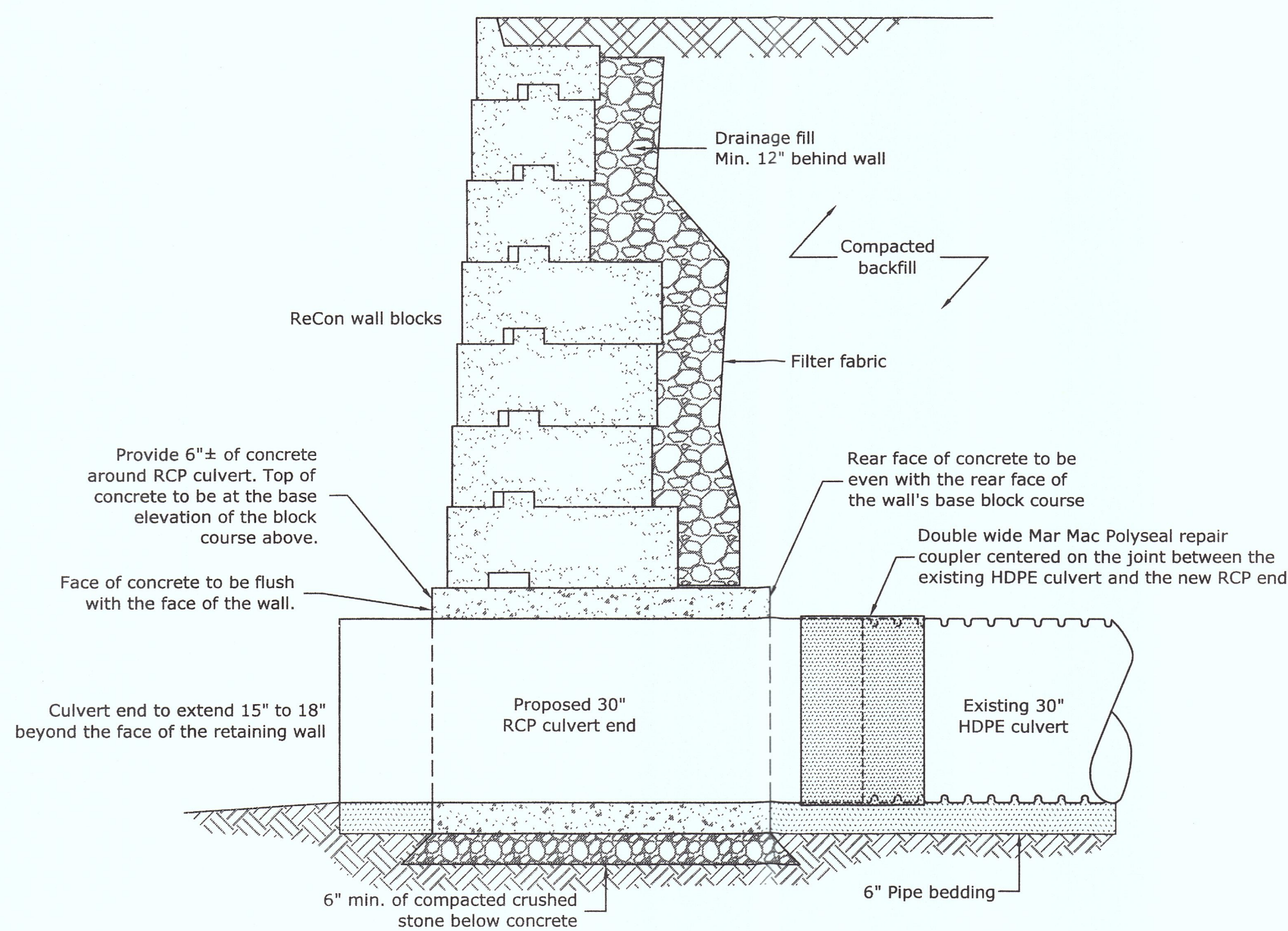
### 9 Course Wall Section

Scale:  $1/2" = 1'-0"$



FENCE SECTION DETAIL

### PRECAST FENCE POST HOLES



### Culvert Through Wall Section

Scale: 1/2" = 1'-0"

2